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SHORT REPORT

Patch Corrugation on Duplex Ultrasonography may be an Early Warning of Prosthetic Patch Infection

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Four of 10 patients presenting with prosthetic patch infection after carotid endarterectomy (CEA) were noted to have Duplex evidence of 'corrugation' of the prosthetic patch, without false aneurysm formation. In three, corrugation preceded diagnosis of overt patch infection by up to 11 months. In the fourth patient, awareness of the potential significance of patch corrugation enabled timely treatment of an otherwise unrecognized patch infection. Even if other imaging modalities are normal, the presence of patch corrugation on Duplex should prompt the surgeon to (at least) consider the possibility of patch infection.

Keywords: Carotid endarterectomy; Patch infection; Corrugation.

Introduction

Prosthetic patch infection is a rare, but potentially devastating complication after carotid endarterectomy (CEA)[1] and the key is identifying the at-risk patient before catastrophic haemorrhage occurs. There are a number of investigative techniques available, but none are infallible. This paper proposes that surgeons should be alerted to the possibility of infection should Duplex reveal 'corrugation' of the patch in an otherwise healthy patient.

Materials and Methods

This unit recently published outcomes following eight patch infections after 936 CEAs.[1] Two more infections have since been treated and in both, 'corrugation' of the patch was noted on Duplex ultrasound prior to the diagnosis of infection being made. Accordingly, the case-records from the original eight patients were reviewed. In two, the presence of patch corrugation was present and preceded diagnosis of infection.

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Results

Table 1 summarises the time delay between the demonstration of patch corrugation and the diagnosis of patch infection. The management of cases 1 and 2 have been reported previously,[1] though not the observation that corrugation preceded diagnosis. As can be seen, cases 1, 2 and 3 followed a similar pattern and patch corrugation (Fig. 1) was recognised 7–11 months before the diagnosis of infection was made. At the time of planning definitive treatment, Duplex again confirmed the presence of persisting corrugation (in the absence of false aneurysm formation). Three of the four subsequently underwent a negative labeled white cell scan, while two underwent normal angiography and CT scanning, respectively.

When the corrugation in case 4 was noted, the sonographer commented that the appearances were very similar to that observed with case 3. This prompted the surgeon to suspect infection. Although there was no evidence of deep infection on CT or labeled white cell scanning, the patient developed a small, (<1 cm) nodule over the wound and was explored within 1 month of the diagnosis of patch corrugation. A definite graft infection was encountered and treated by patch excision, debridement and saphenous vein bypass. Fig. 1(B) clearly shows that the 'corrugation' noted on Duplex corresponded to an area of partial anastomotic dehiscence, but without false aneurysm formation.

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Table 1. Patient details of onset of carotid patch corrugation and timing to diagnosis of infection

Patient	Age	Sex	Time from CEA to patch corrugation being detected on Duplex (months)	Time from CEA to diagnosis of patch infection (months)	Time from corrugation to diagnosis of patch infection	Other investigations tests done once infection suspected	Final clinical presentation
1	80	F	8	18	10 months	Labelled white cell scan: negative	Chronic sinus
2	76	F	34	41	7 months		Chronic sinus
3	74	F	12	23	11 months	Labelled white cell scan: negative Carotid angiogram: no false aneurysm	Chronic sinus
4	75	F	9	10	1 month	Cultures: negative CT scan: negative Labelled white cell scan: negative	Minimal discharge from small wound nodule. No evidence of deep track or abscess

Discussion

All of these patients underwent intra-operative quality control imaging and none had any evidence of patch irregularity at the end of the procedure. In addition, several different types of prosthetic patch have been used over the last decade and the development of corrugation was not associated with any particular patch type.

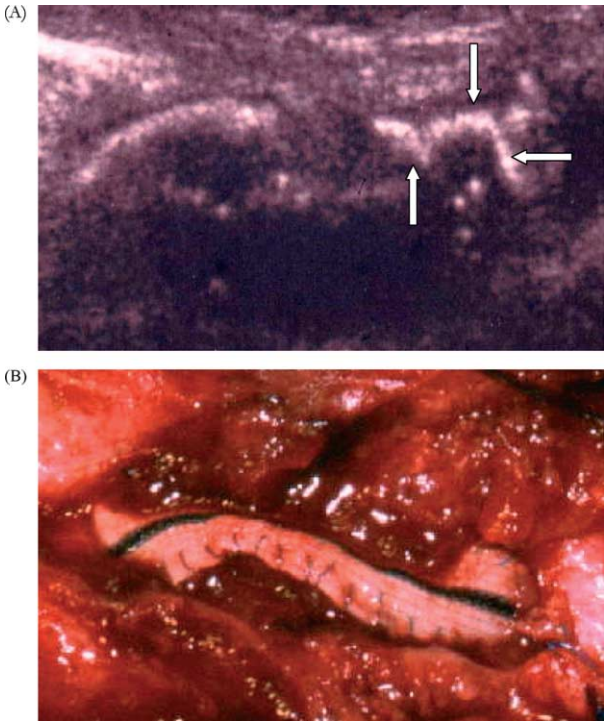

Fig. 1. (A) Duplex scan demonstrating irregularity or 'corrugation' of the prosthetic patch (white arrows). (B) Operative views of carotid patch infection (same patient as in (a)). Note that the area of 'corrugation' corresponds to partial dehiscence of the anastomosis. Thrombus fills the defect between the patch edge and the native arterial wall without false aneurysm formation.

However, it is not possible to conclude that corrugation invariably precedes patch infection, not least because we do not have serial imaging data on the 1200 patients undergoing CEA during this time. However, 133 CEA patients randomised to prosthetic patch closure in this unit were serially screened with ultrasound for 3 years. No cases of corrugation were identified and no patient developed a patch infection.[2] This suggests that the phenomenon is very rare and unlikely to be associated with a normal anastomosis. Accordingly, we still do not routinely Duplex screen our CEA patients following surgery, but would undertake ultrasound examination in any patient reporting recurrent symptoms or pain deep to the wound.

In conclusion, if patch corrugation is found on Duplex imaging, the surgeon should adopt a heightened awareness of the possibility of infection and not simply dismiss it as a spurious finding. To our knowledge, this association has not been described previously.

References

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